

Claims

1. A system for monitoring motion of a subject, the system comprising:
a plurality of sensor elements mounted to movable body segments of a
5 subject, said sensor elements capable of sensing parameters associated
with individual movement of the body segments;
at least one control device for receiving said sensing parameters from said
sensor elements and combining said sensing parameters to determine
overall motion of said movable body segments; and
10 an analysis means for analysing said overall motion of said movable body
segments to determine whether said overall motion of said movable body
segments is within acceptable limits.
2. The system of claim 1 wherein the analysis means is a software
15 program that is stored on said control device.
3. The system of claim 1 wherein the analysis means also monitors
accumulated load and provides an alarm if accumulated load exceeds an
acceptable limit.
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4. The system of claim 1 wherein the analysis means compares
parameters associated with said overall motion with parameters
associated with a motion within safe and accepted limits and indicates
whether the overall motion of the subject is within said safe and accepted
25 limits.
5. The system of claim 1 further comprising a remote computing
device wherein the analysis means is a software program stored on said
remote computing device.
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6. The system of claim 1 comprising a control device embedded in
each said sensor element.

7. The system of claim 6 wherein the analysis means comprises a remote computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits.

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8. The system of claim 6 wherein the analysis means comprises a portable computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits.

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9. The system of claim 1 wherein the control device is a central control device in the form of a portable computing device which centrally receives said sensing parameters from the sensing elements and combines the sensing parameters to determine overall motion of said movable body segments.

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10. The system of claim 9 wherein the analysis means is software programmed in the portable computing device.

20 11. The system of claim 1 further wherein the analysis means is a remote computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits.

25 12. The system of claim 1 further comprising a transmitter means associated with each said sensor element.

13. The system of claim 12 further comprising a remote computing device, the at least one control device and the analysis means are
30 programmed in said remote computing device and each sensor transmits said sensing parameters to the remote computing device for determination of the overall motion and analysis of the motion.

14. The system of claim 6 further comprising a central control device worn on the subject and wherein the analysis means is software programmed in the central control device.
- 5 15. The system of claim 6 further comprising a remote computing device remote from the subject wherein the analysis means is software programmed in the remote computing device.
16. The system of claim 1 wherein the sensor element includes a data
10 memory and microprocessor for storing and processing said sensed parameters.
17. The system of claim 1 wherein each sensor element includes at least one gyroscope and at least one accelerometer for measuring angular
15 velocity of the movable body segment in at least one or more planes of motion and for measuring acceleration components.
18. The system of claim 1 wherein each sensor element includes a magnetometer.
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19. The system of claim 1 wherein each sensor element includes at least one gyroscope, at least one accelerometer and at least one magnetometer and measures absolute motion and position in three dimensions.
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20. The system of claim 1 wherein each sensor element includes one or more signal conditioning means.
21. The system of claim 1 wherein each sensor element includes one or
30 more external sensor inputs.
22. The system of claim 1 wherein each control device has a display screen.

23. The system of claim 22 wherein the display screen is a touch used by an operator for analysis and display of motion data obtained by the system.

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24. The system of claim 1 wherein the control device includes a memory card slot.

25. The system of claim 1 further comprising an interface unit that
10 facilitates bi-directional communication between said one or more control devices and said plurality of sensor elements.

26. The system of claim 25 wherein interface unit includes a remote control interface.

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27. The system of claim 1 wherein the control device includes a remote control facility that enables an operator to interact with the system remotely without the need for physically operating the control device.

20 28. A method of monitoring motion of a subject including the steps of:
sensing parameters associated with individual movement of one or more body segments;
combining said sensing parameters to determine overall motion of said body segments;
25 analysing said overall motion to determine if said motion is within acceptable limits; and
indicating whether said overall motion is within said acceptable limits.

29. The method of claim 28 further including the step of recording said
30 overall motion for later analysis.

30. The method of claim 28 wherein said parameters include one or more of angular velocities in the sagittal, coronal and transverse planes of

said body segments and linear acceleration experienced in three dimensions in relation to said body segments.

31. The method of claim 28 wherein said parameters include one or
5 more of sagittal, coronal and relative transverse angles of said body segments.

32. The method of claim 28 further including the step of measuring pressure as a resistance measurement from pressure sensors associated
10 with at least one of said one or more body segments.

33. The method of claim 28 further including the step of measuring strain via strain gauges associated with at least one of said one or more body segments.

15 34. The method of claim 28 further including the step of measuring one or more other parameters from devices including heart rate monitors, other physiological measurement devices, instrumented shoes and fixed force plates.

20 35. The method of claim 28 further including the step of the analysis means monitoring accumulated load and providing an alarm if accumulated load exceeds an acceptable limit.